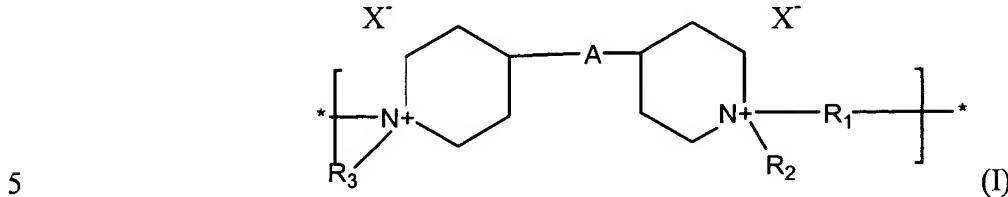


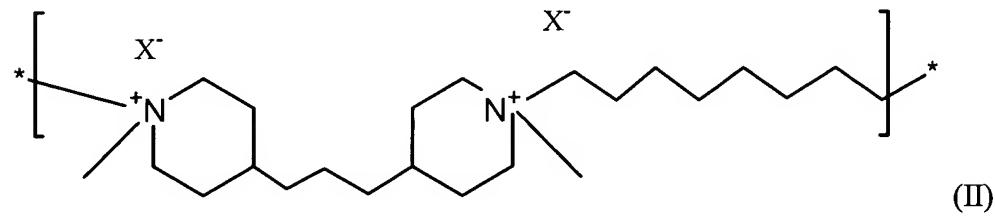
What is claimed is:

1. A polymer or copolymer characterized by a repeat unit having the formula:

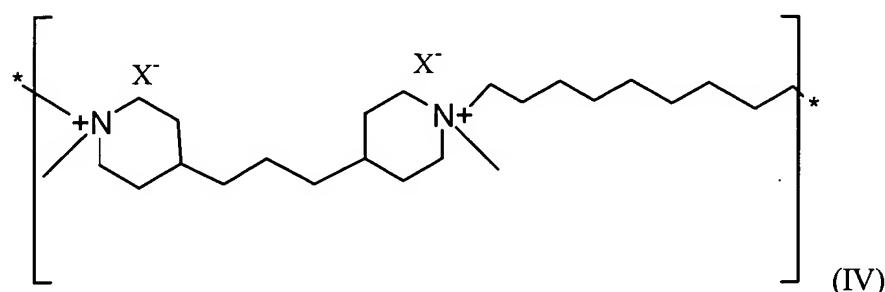
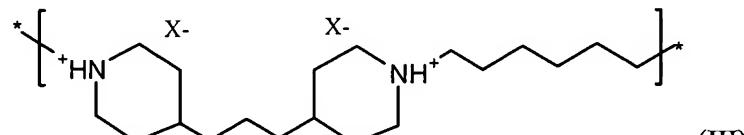


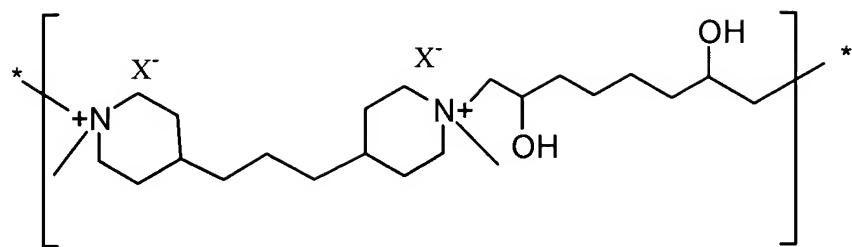
wherein R₁ is a substituted or unsubstituted lower alkylene group; R₂ and R₃ are each independently hydrogen or a substituted or unsubstituted lower alkyl; A is a bond or a substituted or unsubstituted lower alkylene group; and each X⁻, separately or taken together, is a physiologically acceptable anion.

- 10 2. The polymer or copolymer of Claim 1 wherein the polymer or copolymer is characterized by a repeat unit of formula II, III or IV:

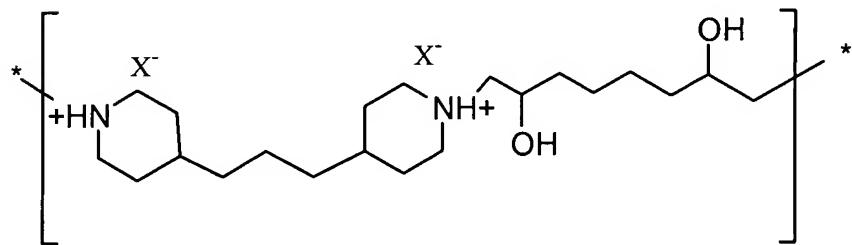


15

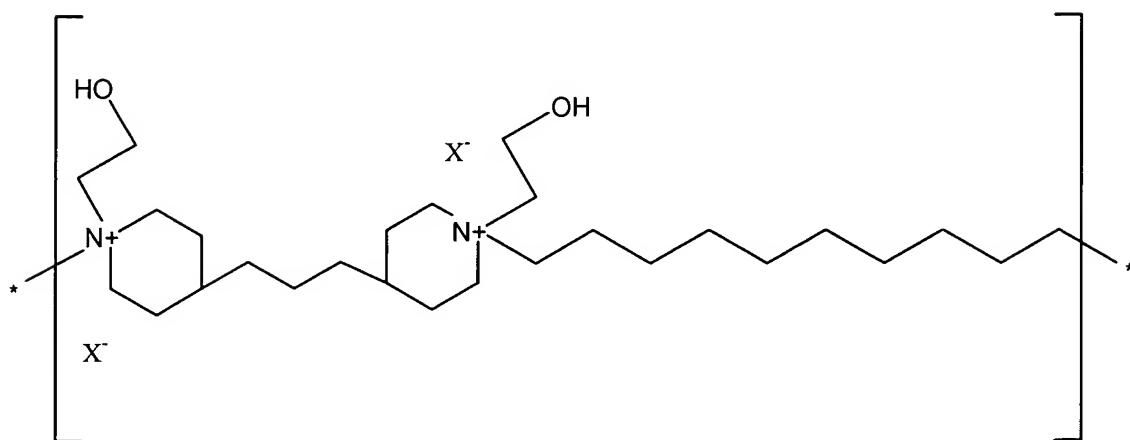




(V)



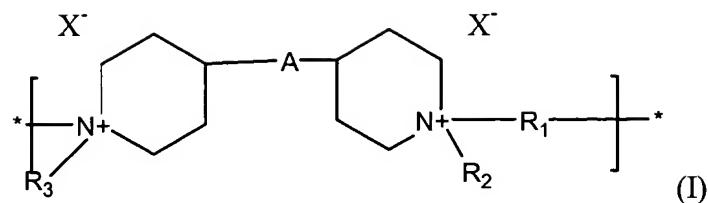
(VI)



(VII).

10 3. A pharmaceutical composition comprising a polymer or copolymer characterized by a repeat unit having the formula:

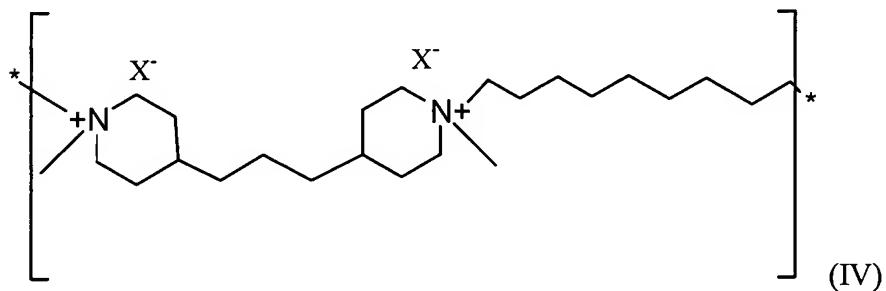
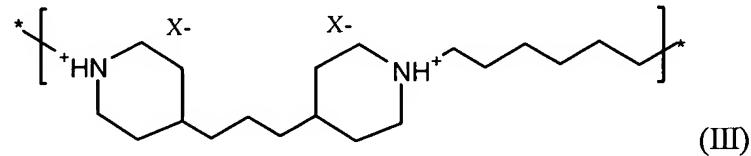
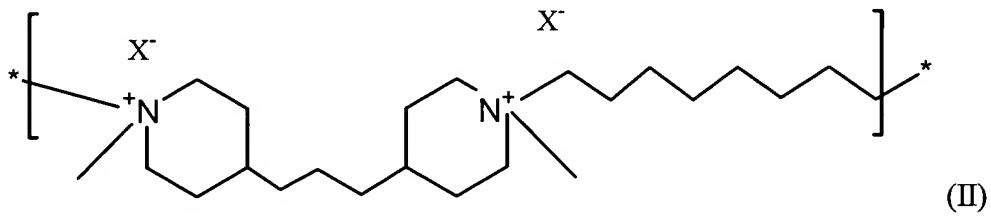
10001765 - 041202



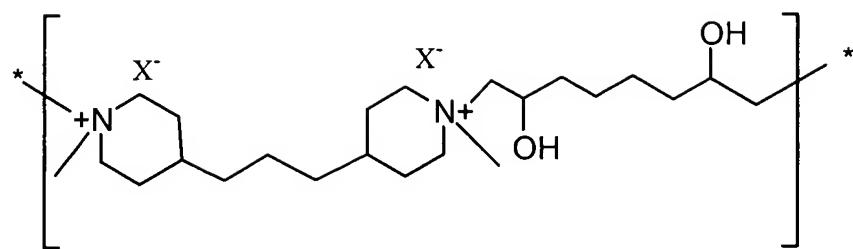
wherein R₁ is a substituted or unsubstituted lower alkylene group; R₂ and R₃ are each independently hydrogen or a substituted or unsubstituted lower alkyl group; A is a bond or a substituted or unsubstituted lower alkylene group and each X⁻, separately or taken together, is a physiologically acceptable anion; and a physiologically acceptable diluent or carrier.

5

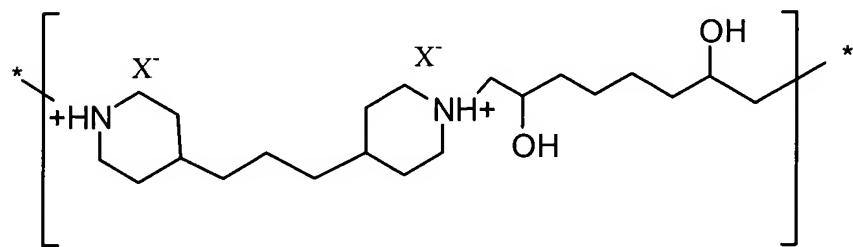
4. The pharmaceutical composition of Claim 3 wherein the polymer or copolymer
10 is characterized by repeat units of formula II, III or IV:



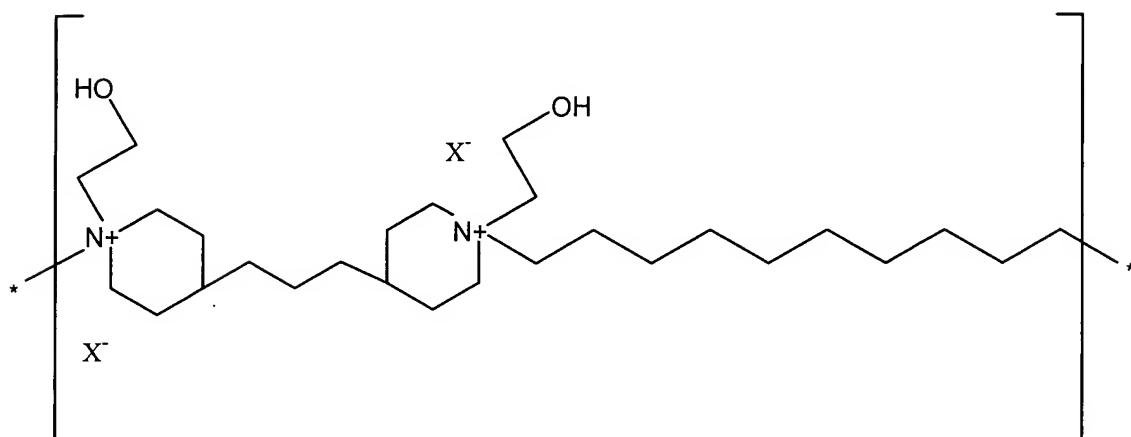
100-512-5982-041200



(V)



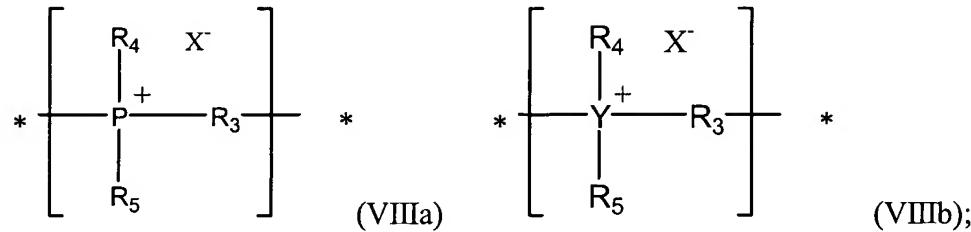
(VI)



(VII).

10 5. A method of treating a microbial infection in a mammal comprising the step of administering to said mammal a therapeutically effective amount of a polymer or copolymer of Claim 1.

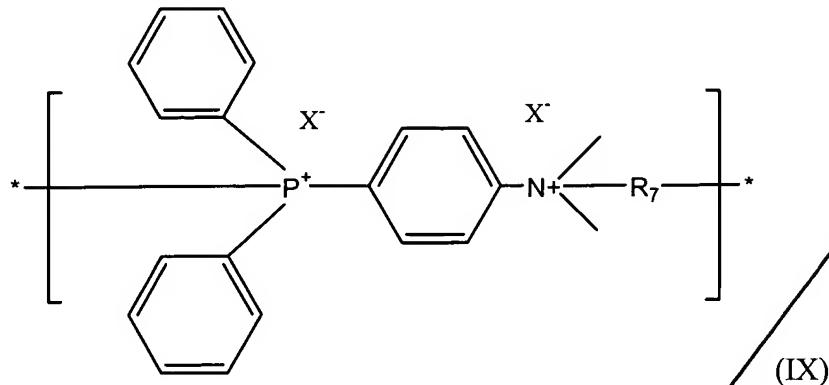
6. A method of treating a microbial infection in a mammal comprising the step of administering to said mammal a therapeutically effective amount of a polymer or copolymer of Claim 2.
- 5 7. A method of treating a microbial infection in a mammal comprising the step of administering to said mammal a therapeutically effective amount of a pharmaceutical composition of Claim 3.
- 10 8. A method of treating a microbial infection in a mammal comprising the step of administering to said mammal a therapeutically effective amount of a pharmaceutical composition of Claim 4.
- 15 9. A method of inhibiting the growth of a microorganism on a surface comprising the step of contacting said surface with an effective amount of a polymer or copolymer of Claim 1.
- 20 10. A method of inhibiting the growth of a microorganism on a surface comprising the step of contacting said surface with an effective amount of a polymer or copolymer of Claim 2.
11. A polymer or copolymer characterized by a repeat unit of formula VIIIa and a repeat unit of formula VIIIb:



wherein Y is P or N; R₃ is a substituted or unsubstituted arylene or lower alkylene group, R₄ and R₅ are independently a substituted or unsubstituted aliphatic or aromatic group; and each X⁻ in the polymer or copolymer, separately or taken together, is a physiologically acceptable anion.

1932.1110-002

- Sub A2*
12. The polymer or copolymer of Claim 11, wherein the polymer or copolymer is characterized by repeat units of the formula:

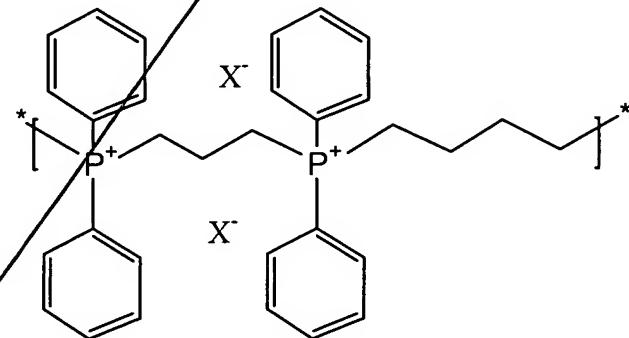


(IX)

5

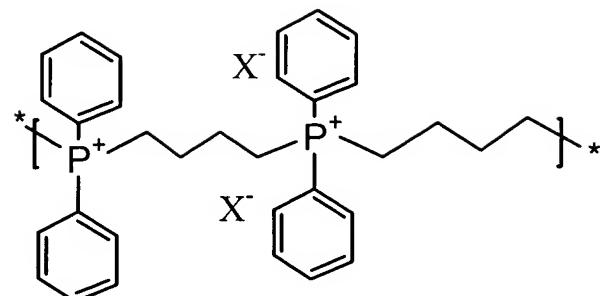
wherein R_7 is a substituted or unsubstituted lower alkylene group having from 1 to about 24 carbon atoms and each X^- , separately or taken together, is a physiologically acceptable anion.

- 10 13. The polymer or copolymer of Claim 11 wherein the polymer or copolymer is characterized by repeat units of formula X or XI:



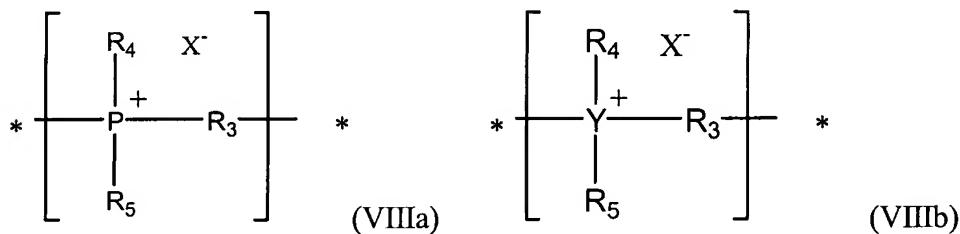
(X)

10054265 014202



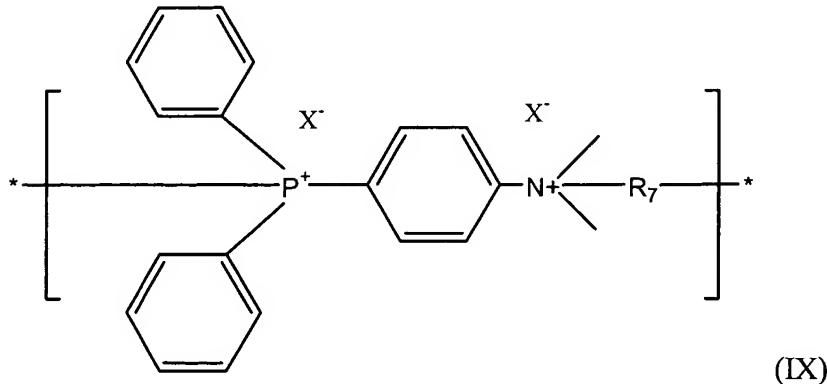
(XI).

14. A pharmaceutical composition comprising a physiologically acceptable carrier or diluent and a polymer or copolymer characterized by a repeat unit of formula VIIIa and a repeat unit of formula Vb:
- 5



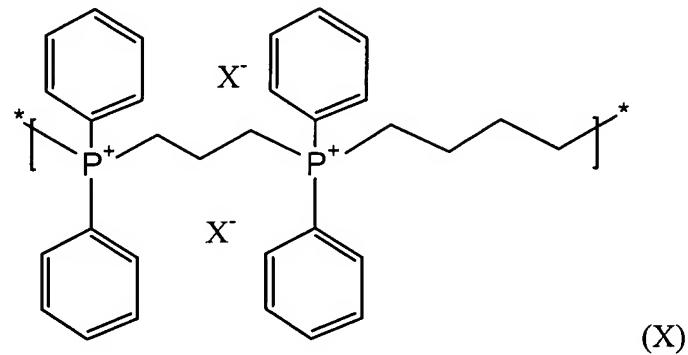
10 wherein Y is P or N; R₃ is a substituted or unsubstituted arylene or lower alkylene group, R₄ and R₅ are independently a substituted or unsubstituted aliphatic or aromatic group; and each X⁻ in the polymer or copolymer, separately or taken together, is a physiologically acceptable anion.

15. A pharmaceutical composition comprising a physiologically acceptable carrier or diluent and a polymer or copolymer characterized by a repeat unit of formula IX:

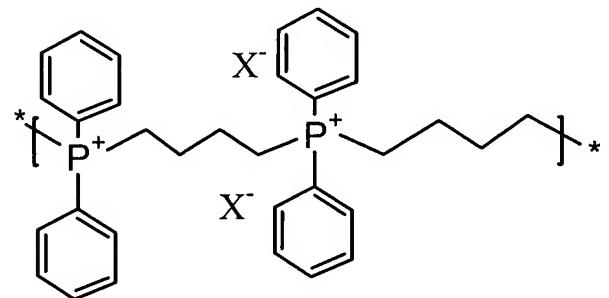


wherein R₇ is a substituted or unsubstituted lower alkylene group having from 1 to about 24 carbon atoms and each X⁻, separately or taken together, is a physiologically acceptable anion.

- 5 16. The pharmaceutical composition of Claim 14 wherein the polymer or copolymer is characterized by repeat units of formula X or XI:



10



17. A method of treating a microbial infection in a mammal comprising the step of administering to said mammal a therapeutically effective amount of a polymer or copolymer of Claim 11.

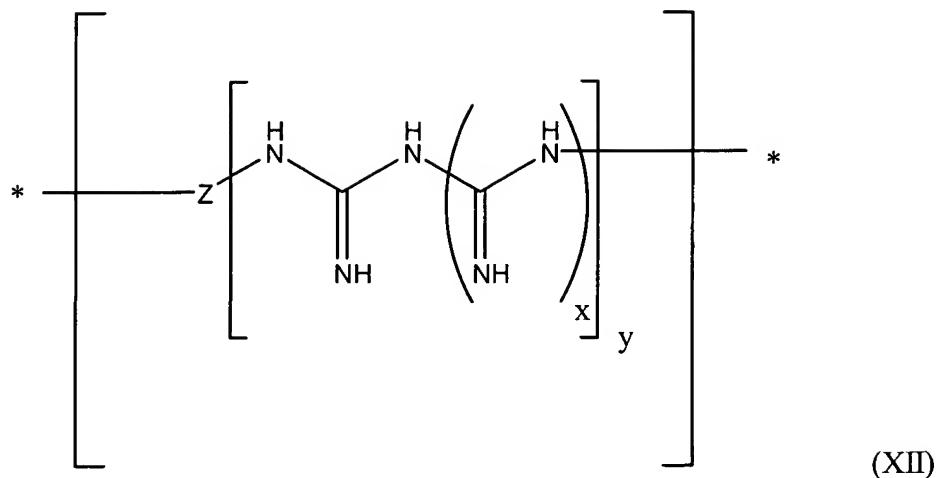
15

18. A method of treating a microbial infection in a mammal comprising the step of administering to said mammal a therapeutically effective amount of a polymer or copolymer of Claim 12.

1932.1110-002

19. A method of treating a microbial infection in a mammal comprising the step of administering to said mammal a therapeutically effective amount of a polymer or copolymer of Claim 13.
- 5 20. A method of treating a microbial infection in a mammal comprising the step of administering to said mammal a therapeutically effective amount of a pharmaceutical composition of Claim 14.
- 10 21. A method of treating a microbial infection in a mammal comprising the step of administering to said mammal a therapeutically effective amount of a pharmaceutical composition of Claim 15.
- 15 22. A method of treating a microbial infection in a mammal comprising the step of administering to said mammal a therapeutically effective amount of a pharmaceutical composition of Claim 16.
- 20 23. A method of inhibiting the growth of a microorganism on a surface comprising the step of contacting said surface with an effective amount of a polymer or copolymer of Claim 11.
24. A method of inhibiting the growth of a microorganism on a surface comprising the step of contacting said surface with an effective amount of a polymer or copolymer of Claim 12.
- 25 25. A method of inhibiting the growth of a microorganism on a surface comprising the step of contacting said surface with an effective amount of a polymer or copolymer of Claim 13.
26. A polymer or copolymer characterized by a repeat unit having the formula:

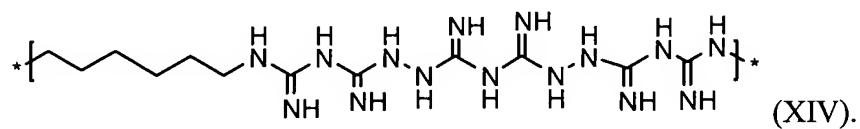
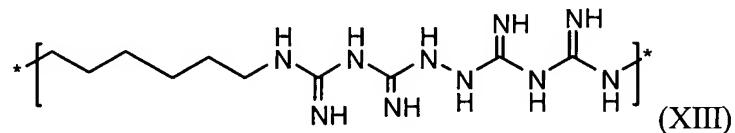
20054763-014700



and physiologically acceptable salts thereof, wherein Z is a substituted or unsubstituted lower alkylene or lower alkylene glycol group; x is an integer from 1-4; and y is an integer from 2-5.

5

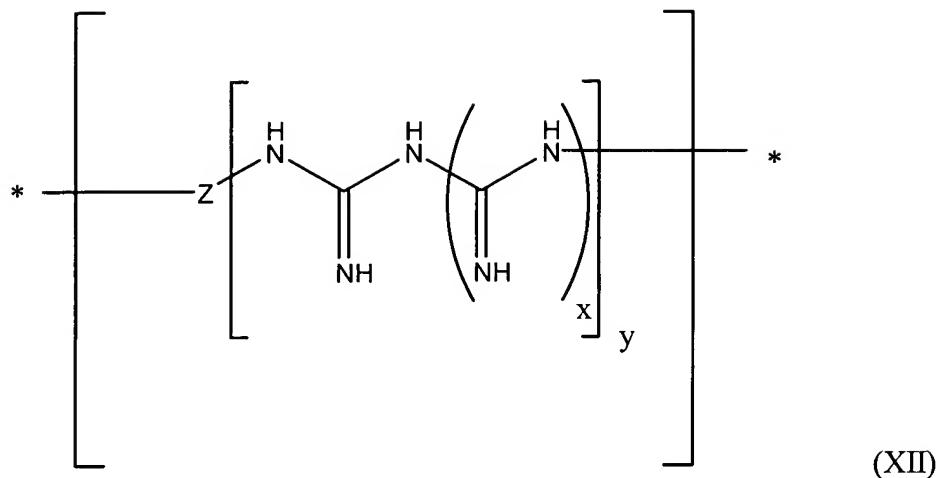
27. The polymer or copolymer of Claim 26 wherein the polymer and copolymer are characterized by repeat units of formula XIII or XIV:



10

28✓ A pharmaceutical composition comprising a physiologically acceptable diluent or carrier and a polymer or copolymer characterized by a repeat unit having the formula:

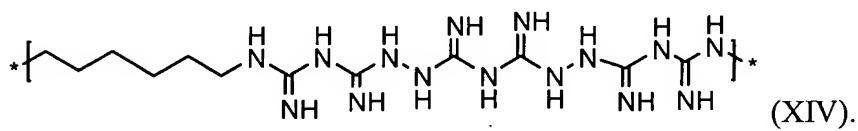
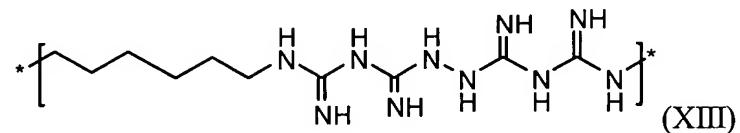
10051765-011202



or a physiologically acceptable salts thereof, wherein Z is a substituted or unsubstituted lower alkylene or lower alkylene glycol group; x is an integer from 1-4; and y is an integer from 2-5.

5

29. The pharmaceutical composition of Claim 28 wherein the polymer or copolymer is characterized by repeat units of formula XIII or XIV:



10

30. A method of treating a microbial infection in a mammal comprising the step of administering to said mammal a therapeutically effective amount of a polymer or copolymer of Claim 26 or a pharmaceutically acceptable salt thereof.

15

31. A method of treating a microbial infection in a mammal comprising the step of administering to said mammal a therapeutically effective amount of a polymer or copolymer of Claim 27 or a pharmaceutically acceptable salt thereof.

1005175-04122

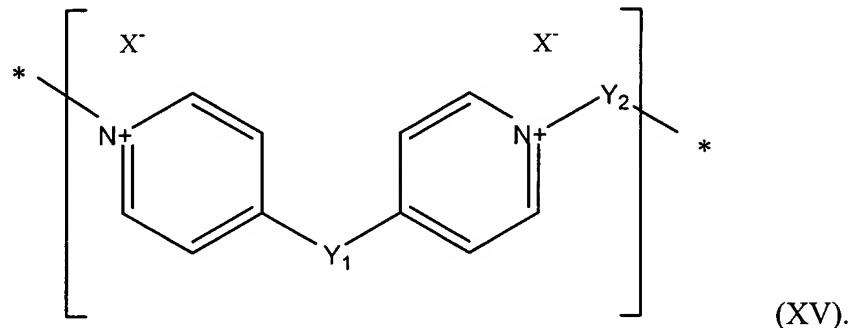
32. A method of treating a microbial infection in a mammal comprising the step of administering to said mammal a therapeutically effective amount of a pharmaceutical composition of Claim 28.

5 33. A method of treating a microbial infection in a mammal comprising the step of administering to said mammal a therapeutically effective amount of a pharmaceutical composition of Claim 29.

10 34. A method of inhibiting the growth of a microorganism on a surface comprising the step of contacting said surface with an effective amount of a polymer or copolymer of Claim 26 or a pharmaceutically acceptable salt thereof.

15 35. A method of inhibiting the growth of a microorganism on a surface comprising the step of contacting said surface with an effective amount of a polymer or copolymer of Claim 27 or a pharmaceutically acceptable salt thereof.

36✓ A polymer or copolymer characterized by a repeat unit having the formula:



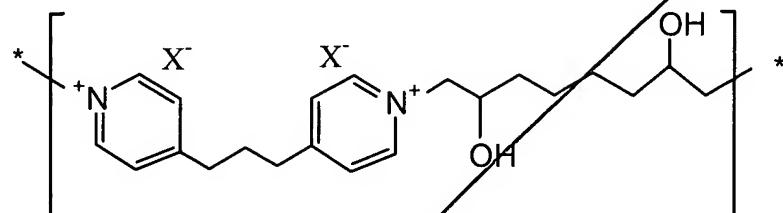
20 wherein Y₁ and Y₂ are independently a lower alkylene or lower alkylene glycol group, provided that Y₂ is substituted with two or more alcohol groups; each X⁻, separately or taken together, is a physiologically acceptable anion; and said polymer or copolymer is substantially free of diphenol.

25 37. The polymer of Claim 36, wherein said polymer is a homopolymer.

Sub
Q3

38. The polymer or copolymer of C claim 36 wherein the polymer or copolymer is characterized by repeat units of formula XVI or XVII:

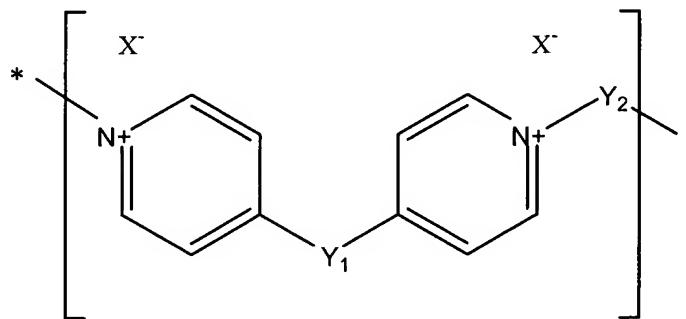
5



(XVI)

10051985 "011202

- 10 39. A pharmaceutical composition comprising a physiologically acceptable carrier or diluent and a polymer or copolymer characterized by a repeat unit having the formula:

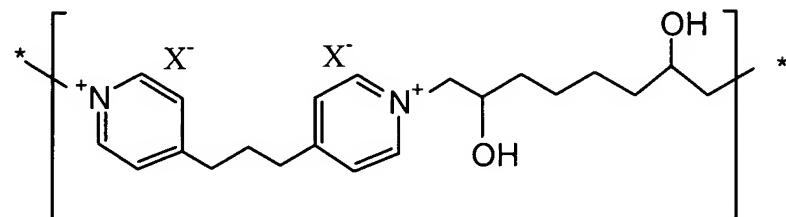


(XVII).

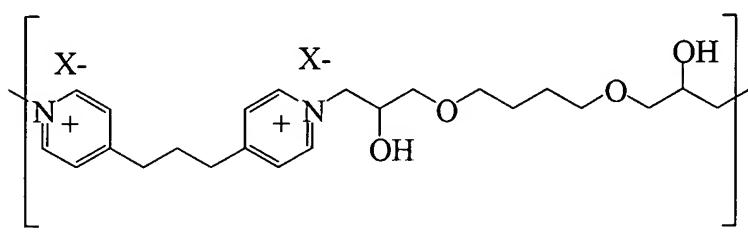
- 15 wherein Y_1 and Y_2 are each independently a substituted or unsubstituted lower alkylene or lower alkylene glycol group; and each X^- , separately or taken together, is a physiologically acceptable anion.

40. The pharmaceutical composition of Claim 39, wherein at least one lower alkylene or lower alkylene glycol group represented by Y₁ and Y₂ is substituted.

41. The pharmaceutical composition of Claim 39, wherein the polymer or
5 copolymer is characterized by repeat units of formula XVI or XVII:



(XVI)



(XVII).

10 42. A method of treating a microbial infection in a mammal comprising the step of administering to said mammal a therapeutically effective amount of a polymer or copolymer of Claim 36.

15

43. A method of treating a microbial infection in a mammal comprising the step of administering to said mammal a therapeutically effective amount of a homopolymer of Claim 37.

20

44. A method of treating a microbial infection in a mammal comprising the step of administering to said mammal a therapeutically effective amount of a polymer or copolymer of Claim 38.

10051765-011702

45. A method of treating a microbial infection in a mammal comprising the step of administering to said mammal a therapeutically effective amount of a pharmaceutical composition of Claim 39.

5 46. A method of treating a microbial infection in a mammal comprising the step of administering to said mammal a therapeutically effective amount of a pharmaceutical composition of Claim 40.

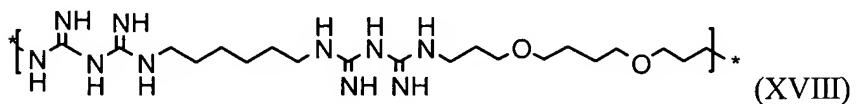
10 47. A method of treating a microbial infection in a mammal comprising the step of administering to said mammal a therapeutically effective amount of a pharmaceutical composition of Claim 41.

15 48. A method of inhibiting the growth of a microorganism on a surface comprising the step of contacting said surface with an effective amount of a polymer or copolymer of Claim 36.

20 49. A method of inhibiting the growth of a microorganism on a surface comprising the step of contacting said surface with an effective amount of a homopolymer of Claim 37.

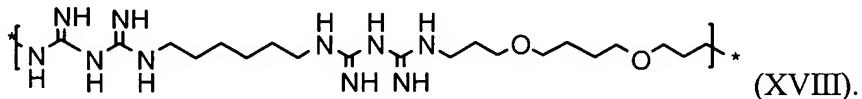
50. A method of inhibiting the growth of a microorganism on a surface comprising the step of contacting said surface with an effective amount of a polymer or copolymer of Claim 38.

25 51. A polymer or copolymer characterized by a repeat unit having the formula:



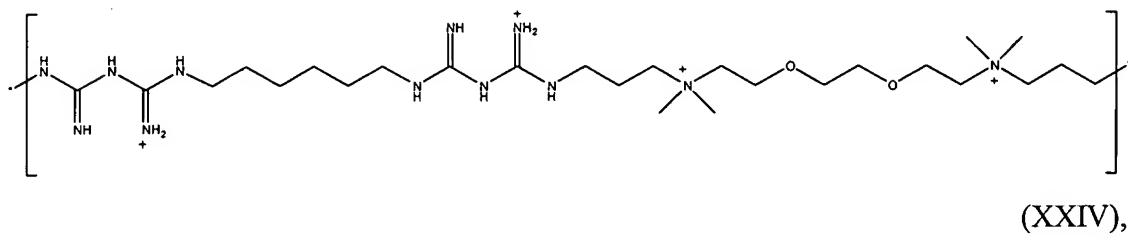
and physiologically acceptable salts thereof.

52. ✓ A pharmaceutical composition comprising a polymer, copolymer or a physiologically acceptable salt thereof, and a pharmaceutically acceptable carrier or diluent, wherein the polymer and copolymer are characterized by a repeat unit having
 5 the formula:



53. A polymer or copolymer characterized by a repeat unit having the formula:

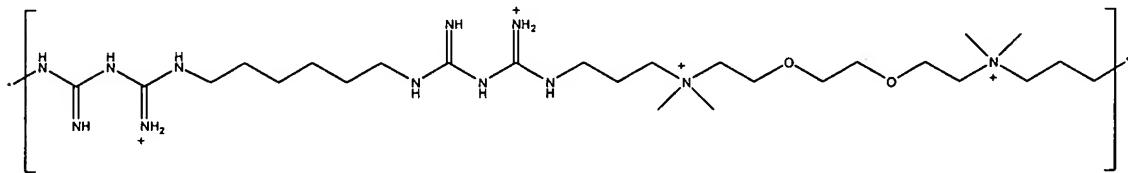
10



and physiologically acceptable salts thereof.

15

54. A pharmaceutical composition comprising a polymer, copolymer or a physiologically acceptable salt thereof, and a pharmaceutically acceptable carrier or diluent, wherein the polymer and copolymer are characterized by a repeat unit having the formula:



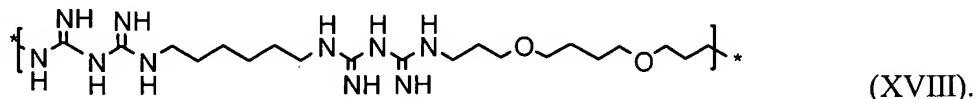
(XXIV).

20

55. A method of treating a microbial infection in a mammal comprising the step of administering to said mammal a therapeutically effective amount of a pharmaceutical composition of Claim 52.

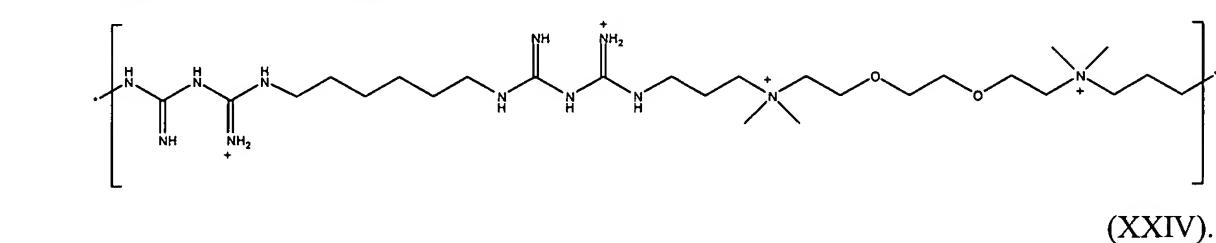
56. A method of inhibiting the growth of a microorganism on a surface comprising the step of contacting said surface with an effective amount of a polymer, copolymer or physiologically acceptable salt thereof, wherein the polymer or copolymer is characterized by a repeat unit having the formula:

5

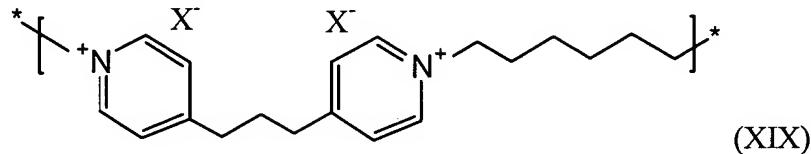


57. A method of treating a microbial infection in a mammal comprising the step of administering to said mammal a therapeutically effective amount of a pharmaceutical composition of claim 54.

10 58. A method of inhibiting the growth of a microorganism on a surface comprising the step of contacting said surface with an effective amount of a polymer, copolymer or physiologically acceptable salt thereof, wherein the polymer or copolymer is characterized by a repeat unit having the formula:



15 59. A pharmaceutical composition comprising a polymer or copolymer characterized by a repeat unit having the formula:



20 and a pharmaceutically acceptable carrier or diluent, wherein each X⁻, separately or taken together, is a pharmaceutically acceptable anion.

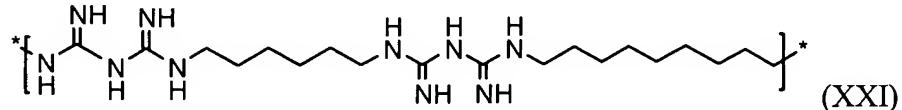
25

20052005-0020

60. A method of treating a microbial infection in the gastrointestinal tract of a mammal comprising the step of administering to said mammal a therapeutically effective amount of a pharmaceutical composition of claim 59.

5

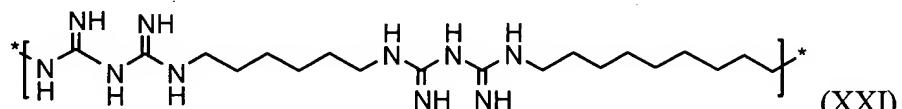
61. A polymer or copolymer characterized by a repeat unit having the formula:



and physiologically acceptable salts of the polymer and copolymer.

10

62. A pharmaceutical composition comprising a polymer, copolymer or a physiologically acceptable salt thereof, wherein the polymer or copolymer is characterized by a repeat unit having the formula:



15

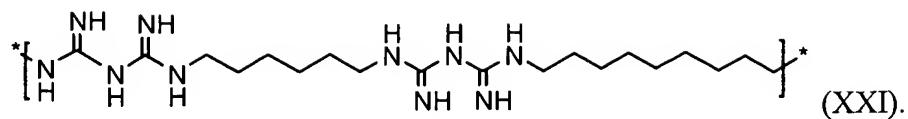
and a pharmaceutically acceptable carrier or diluent.

20

63. A method of treating a microbial infection in a mammal comprising the step of administering to said mammal a therapeutically effective amount of a pharmaceutical composition of Claim 62.

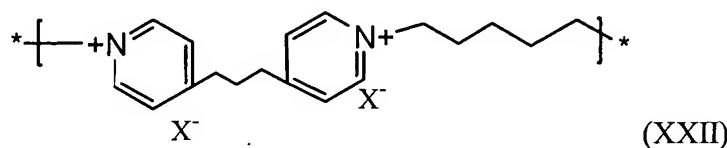
25

64. A method of inhibiting the growth of a microorganism on a surface comprising the step of contacting said surface with an effective amount of a polymer, copolymer or physiologically acceptable salt thereof, wherein the polymer or copolymer is characterized by a repeat unit having the formula:



65. A pharmaceutical composition comprising a polymer or copolymer characterized by a repeat unit having the formula:

5



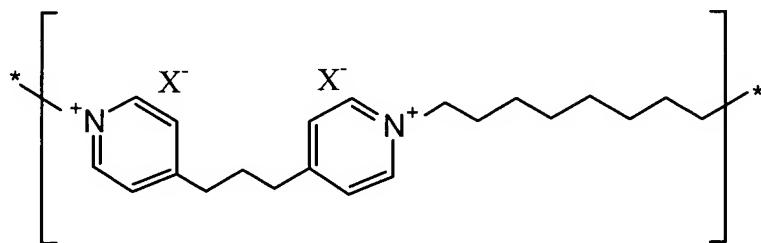
and a pharmaceutically acceptable carrier or diluent, wherein each X^- , separately or taken together, is a physiologically acceptable anion.

10

66. A method of treating a microbial infection of the oral mucosa or gastrointestinal tract of a mammal comprising the step of administering to said mammal a therapeutically effective amount of a pharmaceutical composition of claim 65.

15

67. A copolymer characterized by a repeat unit having the formula:



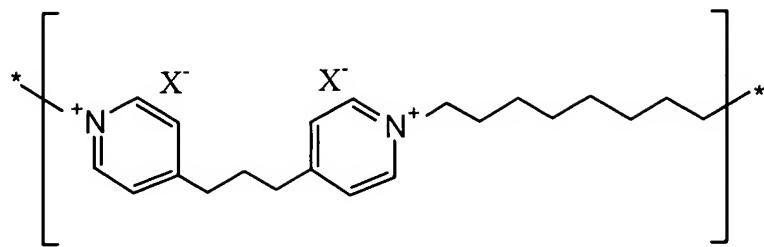
(XXIII)

wherein each X^- , separately or taken together, is a physiologically acceptable anion.

20

68. A pharmaceutical composition comprising a polymer or copolymer characterized by a repeat unit having the formula:

1005475-01202



and a pharmaceutically acceptable carrier or diluent, wherein each X^- , separately or taken together, is a physiologically acceptable anion.

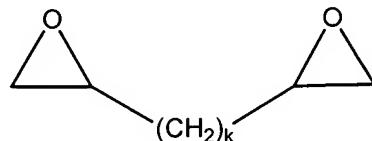
5

69. A method of treating a microbial infection in a mammal comprising the step of administering to said mammal a therapeutically effective amount of a copolymer of claim 67.

10 70. A method of treating a microbial infection in a mammal comprising the step of administering to said mammal a therapeutically effective amount of a pharmaceutical composition of claim 68.

15 71. A method of inhibiting the growth of a microorganism on a surface comprising the step of contacting said surface with an effective amount of a copolymer of claim 67.

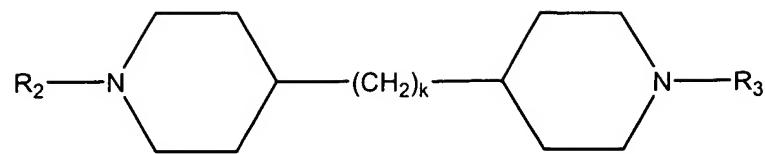
72. A method of preparing an ionene polymer, comprising the step of reacting an α,ω -diaminoalkane, a diepoxide represented by the formula:



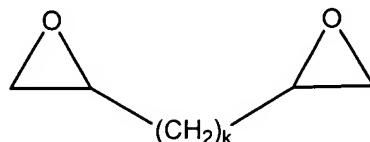
wherein k is an integer from 1 to 10, and an acid.

20

73. A method of preparing an ionene polymer, comprising the step of reacting an α,ω -alkylenedipiperidine represented by the formula:



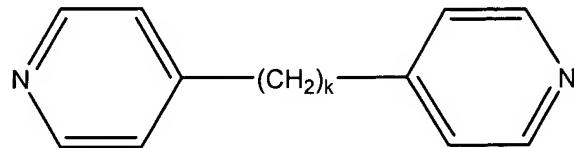
wherein k is an integer from 1 to 10 and R_2 and R_3 are each independently hydrogen or a substituted or unsubstituted lower alkyl group, a diepoxide represented by the formula:



5

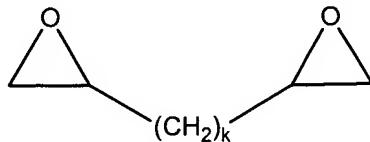
wherein k is an integer from 1 to 10, and an acid.

74. A method of preparing an ionene polymer, comprising the step of reacting an α,ω -alkylenedipyridine represented by the formula:



10

wherein k is an integer from 1 to 10, a diepoxide represented by the formula:



wherein k is an integer from 1 to 10, and an acid.

15

100-2126-0014-002